will have no hesitation whatever in endorsing this statement!

While a great many notions are introduced into the text in such a way as to make them appear useless, uninteresting, and unintelligible, many of the most important points in a rational system of mathematical education receive little or no attention. Take the broad, general notion of a function, so simple that it can be explained to anyone who is sufficiently unmathematical to understand common sense. It is well illustrated in the case of the senior wrangler who entered the Stock Exchange and began to apply algebraic methods to the money market. He failed because he had omitted to take account of political considerations. Here was a case where the result was a function of a number of variables, and he treated some of these variables as constant. The senior wrangler was not sufficient of a mathematician. The mere failure to enumerate all the variables in a function occurring in everyday life represents a national loss of millions per annum. Prof. Perry says:—

"I must confess, however, that the compilers of modern school algebras must make the gods laugh over the uses to which they put this plotting of functions."

They certainly will do so when they read this book.

All this is a very great pity. Most modern mathematical teachers are only too glad to get "formula" questions for their pupils dealing with beams, expansion of steam, flow of water through pipes, electrical resistances, and other practical considerations which familiarise the student in the use of algebraic formulæ and equations. We believe they *can* get the questions they want from this book, and, on the other hand, when it comes to methods of teaching, every teacher naturally prefers his own. But if the substance of the text is a fair indication of what is meant by "practical mathematics," we agree with Prof. Perry's remark (p. xiii.), which, when quoted without its context, reads to the effect that

"The subject of practical mathematics is, I am happy to say, a subject which is not likely to commend itself to such institutions, nor are such text-books likely to be of much use to real students."

Evidently neither "academic" nor "practical" mathematics supplies exactly what is wanted. They both have one fault in common, namely, that they place difficulties before the student without any rhyme or reason. Mathematics is not in itself difficult or uninteresting; a child of three can invent a theory and notation for minus quantities without any assistance, help, or encouragement whatever. What we want is a subject that might be better described as "common-sense mathematics." Teachers are striving after this ideal, and it is very valuable and important to see clearly, as this book shows, that for the attainment of this ideal something more than "practical" mathematics is necessary.

G. H. BRYAN.

AN EGYPTIAN DESERT.

The Geography and Geology of South-eastern Egypt. By Dr. John Ball. (Survey Department of Egypt, Cairo.) Pp. 394. With Maps and many Illustrations.

THE area described in this latest monograph issued by the Geological Survey of Egypt is the southern part of the Eastern Desert—a district little known, and inhabited only by nomad Arabs of the Ababda and Bisharin tribes.

From north to south, this country is intersected by a mountainous axis which rises to heights of from 3000 to more than 5000 feet, and consists mainly of granite, diorite, gabbro, and other plutonic rocks. Eastward from this axis a series of Wadys run down, somewhat steeply, to the shores of the Red Sea on the east, these shores being almost everywhere bordered by coral reefs, which render the coast one of the foulest in the world for shipping. Westward from the mountain axis another series of Wadys lead down more gradually to the basin of the Nile. Dr. Ball, who is an accomplished surveyor as well as a geologist, has been able to add much to our knowledge of the physiography and scenery of this almost unexplored country. While devoting his chief attention to the geological features of the district—his discussion of the petrology being especially full and well illustrated—the author has been able to supply much new and interesting information concerning the antiquities, the plant and animal life, and the inhabitants—their languages, industries, and customs.

From a very early period the district has been credited with the possession of considerable mineral wealth, especially famous having been its gold-mines and emerald workings. Dr. Ball's researches, however, do not give much support to the belief that the district may in the future become a great mining centre.

It is true that very numerous small workings scattered all over the country show how wide and persistent has been the search for gold within the area. There do not appear to have been any alluvial workings, but numerous quartz veins, intersecting all the crystalline rocks of the district, sometimes containing calcite with ores of copper and iron, yield minute quantities of gold,

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the particles of which are seldom visible. In small handmills of diorite this quartz appears to have been ground up and the gold extracted from it, but this appears to have been only profitable when done by convict labour. Prospectors in modern times, guided by the presence of these old workings, have attempted to carry on the extraction of the gold on a larger scale by modern methods, but only in a few cases has it been found that this can be done with profit, and most of the concessions have been surrendered.

The once-famous emerald-workings of Zabara and Sikait in this district are opened in masses of mica-schist, which alternate with gneiss, and contain crystals of tourmaline and beryl—the clear green varieties of this latter mineral constituting the valuable gem emerald. It would appear, however, that the ancients were satisfied with specimens which, owing to their clouded or flawed characters, do not appeal to the jewellers of the present day, and, extensive as the old workings undoubtedly were, there appears to be little chance of the industry being revived.

At several points on the Red-Sea coast, deposits of gypsum and anhydrite, with pockets of sulphur, occur, and concessions for the working of the latter mineral have been granted.

One successful mining industry, however, would appear to be in full operation in the little island of Tuberged, or St. John's, lying out in the Red Sea, forty or fifty miles from the coast. Here, in the midst of serpentine rocks, numerous beautiful crystals of peridot (oliome) are obtained, and the work of exploitation is being successfully carried on.

But although the expectations that this desert region might become a centre of a great mining industry do not seem likely of fulfilment, the district is not devoid of interest to the man of science. The rocks of the country exhibit, as shown by Dr. Ball, a very great variety and not a few remarkable characters, and the book before us, with its abundant photographic and other illustrations, is well worthy of the attention which it cannot fail to attract. J. W. J.

THE PROBLEM OF A PURE MILK SUPPLY.

The Milk Question. By Prof. M. J. Rosenau. Pp. xiv + 309. (London: Constable and Co.; Boston and New York: Houghton Mifflin Co., 1913.) Price 7*s.* 6*d.* net.

THE milk question is very much to the fore at the present time, and the appearance of this work is therefore opportune, and, although it embodies American views and practice, a great deal of it is applicable to our conditions. The author is well known as the present professor of hygiene at Harvard, and former director of the Hygienic Laboratory, Public Health and Marine Service, U.S.A., who has contributed much to the scientific investigation of milk and its bacteriology. From the sanitary point of view the book is sound, but, in addition, its author shows a knowledge of the subject from the producer's point of view, a side of the question which is frequently overlooked by sanitary reformers in this country. Written in simple language, it is a book for the educated public generally, and many striking cartoons and diagrams and terse sayings serve to drive home the views enunciated, *e.g.*—

"It (milk) requires scrupulous care from pasture to pail, and from pail to palate."

"The milk problem starts with the cradle, and ends with the grave. Sometimes it leads to an untimely grave."

One or two considerations may be quoted as illustrating the author's appreciation of the producer's point of view. As regards the question as to where the blame lies for an unhygienic milk supply, the author says the tendency is for the consumer to blame the producer, for the producer to blame the consumer, for the middleman to blame both of these, and for the health officer to blame all three. Really, society must blame itself; we are suffering the inevitable penalties we must pay for modern conditions of life, and of all those concerned the farmer is least to blame for the situation as it exists, and the consumer in the city should be ever mindful that he has largely brought the conditions upon himself.

While expressing the opinion that bottled milk is the ideal method of distribution, Prof. Rosenau fully recognises its dangers and difficulties—difficulties in the cleansing and handling of the bottles and in transportation, which, he points out, is expensive, bulky, the breakage is considerable, and the return freight adds to the cost. He looks forward to the time when milk will be dispensed in some form of cardboard non-returnable package.

On the mixing of milk from several cows, this the author says is desirable, as it furnishes a more uniform product, and tends to dilute infection if present; this the framers of Bills in this country might note.

On the cells present in milk, it is stated that normal milk has relatively few or no leucocytes, and, when critically examined, the majority of cells distinctly differs from leucocytes.

The author would ascribe from 5 to 7 per cent. of all human tuberculosis to infection with the bovine bacillus, but he is careful *not* to suggest that this is necessarily derived from milk, and quotes Weber's observations (made for the

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